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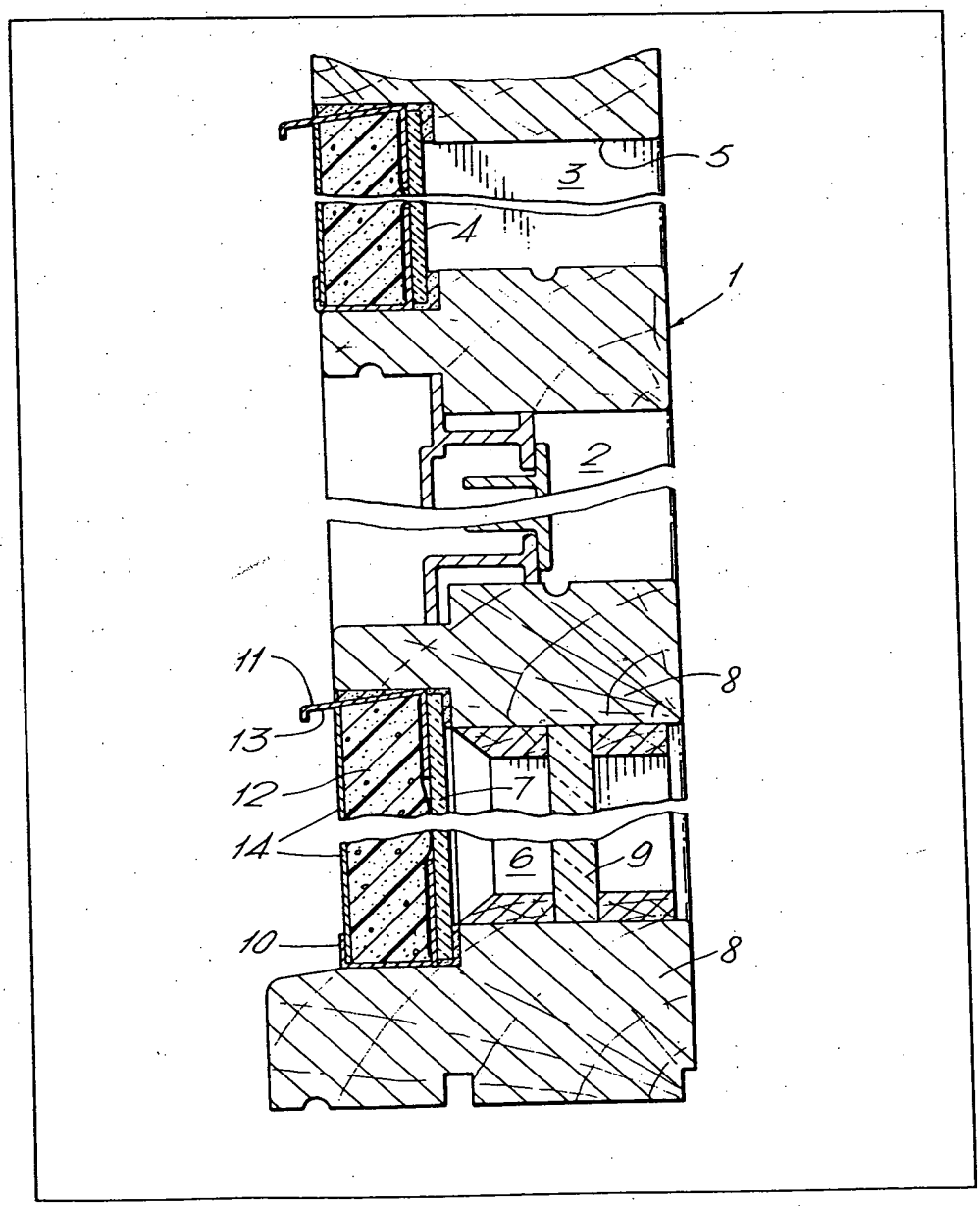
(54) **Thermally-insulating panels**

(57) In order to provide thermal insulation and mechanical protection for an existing window pane (7) or other panel, a panel is mounted on the exterior of the pane. The panel is formed by fitting lower and upper trim members (10,11) to the window frame (8) and inserting a layer of thermally-insulating material (12), such as expanded polystyrene, into the trim so that it fills the frame between the trim members and adheres to the glass (7). Side trim members are then fitted against the insulating layer. A protective sheet (14) is bonded to the insulating layer and covers that layer, thereby protecting it from the weather and from damage. The protective sheet is preferably formed of plastics-coated steel.



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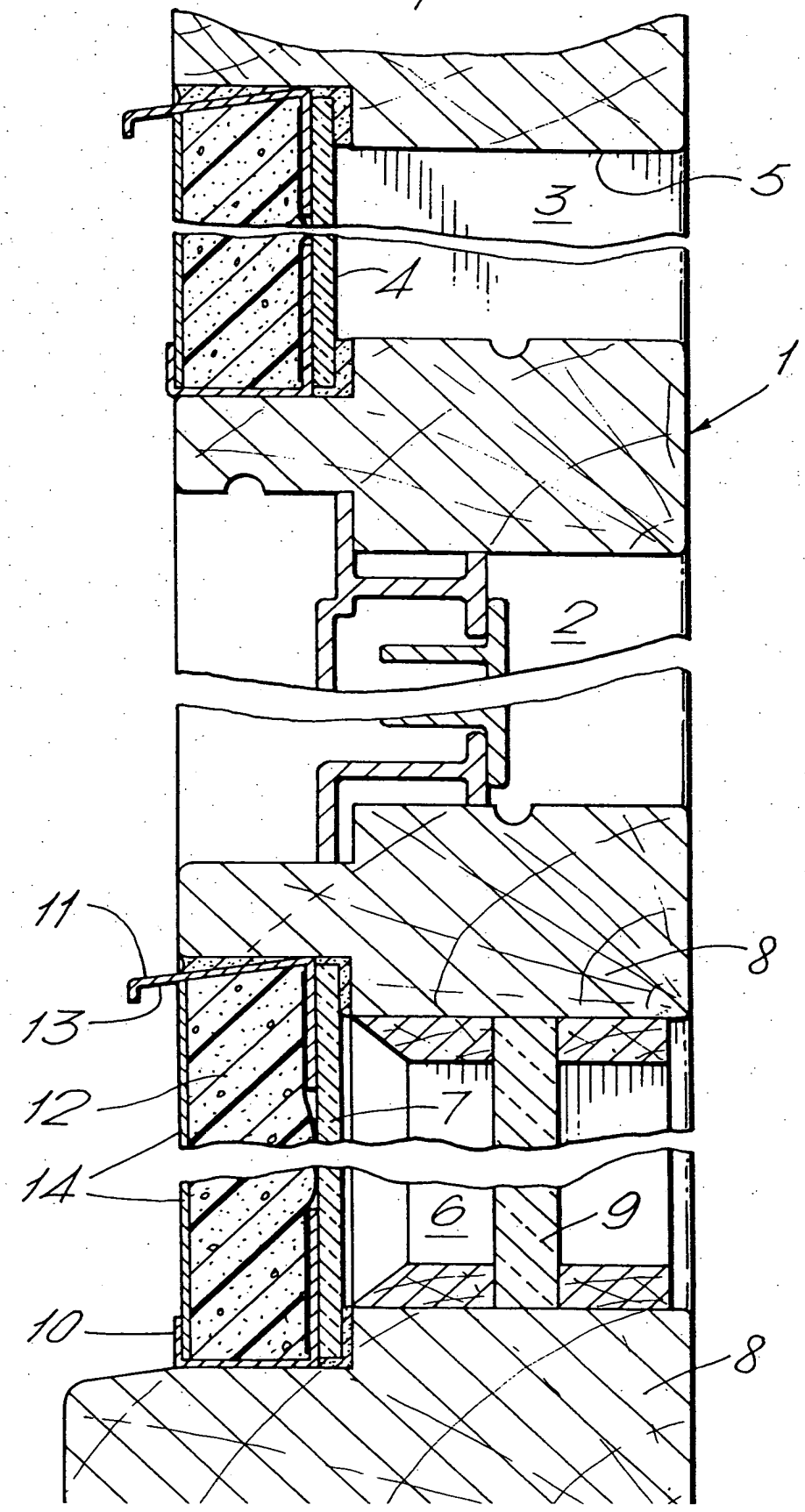

CLAIMS

1. A method of forming a thermally-insulating panel over the surface of a sheet of glass or other water-impervious backing sheet mounted in a frame, comprising locating a trim around the periphery of the sheet and projecting outwardly from the sheet within the frame and attached to the frame; substantially filling the trim with a thermally-insulating material; and covering the thermally-insulating material with a hard waterproof coating.

2. A method as claimed in Claim 1, wherein the thermally-insulating material comprises a sheet of expanded polystyrene.

3. A method as claimed in Claim 1, wherein the thermally-insulating material comprises a sheet of polyurethane foam.

4. A method as claimed in any preceding claim, wherein the waterproof coating comprises a sheet of plastics-coated steel.

5. A method as claimed in any preceding claim, wherein the waterproof coating is bonded to the thermally-insulated material.

6. A method as claimed in any one of Claims 1 - 3, wherein the waterproof coating comprises a cement-based layer.

7. A method as claimed in Claim 6, wherein the cement-based layer is sprayed on to a scrim which is bonded to the thermally-insulating material.

8. A method as claimed in any preceding claim, wherein the trim is formed of aluminium.

9. A method as claimed in any one of Claims 1-7, wherein the trim is formed of unplasticised polyvinyl chloride.

10. A method as claimed in Claim 1 and substantially as hereinbefore described with reference to the accompanying drawing.

11. A window or a door including a thermally-insulating panel formed by a method as claimed in any preceding claim.

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SPECIFICATION

Thermally-insulating panels

This invention relates to a method of forming thermally-insulating panels, and to panels formed thereby.

During the past few decades, many buildings, such as schools, have been constructed with very large window areas. In fact, whole outer walls have been constructed almost entirely of glass, with only relatively small areas of timber or metal frame to support the glass. That method of construction gives the buildings a pleasantly light, open, appearance, but in winter a very considerable amount of heat is lost from within the building due to the relatively high thermal conductivity of the glass. The cost of heating the building is now so high, and the need to conserve energy so pressing, that consideration is now being given to covering lower and/or upper areas of the glass with thermal-insulating materials.

It is an object of the present invention to provide a thermally-insulating panel over the surface of a pane of glass. The panel may alternatively be provided over other water-impervious backing sheets, for example metal or waterproof plywood sheets.

According to the invention, a method of forming a thermally-insulating panel over the surface of a sheet of glass or other water-impervious backing sheet mounted in a frame comprises locating a trim around the periphery of the sheet and projecting outwardly from the sheet within the frame and attached to the frame; substantially filling the trim with a thermally-insulating material; and covering the thermally-insulating material with a hard waterproof coating.

Preferably the thermally-insulating material comprises a sheet of extruded expanded polystyrene or a sheet of polyurethane foam.

The waterproof coating is preferably a plastics-coated steel sheet, but it may, alternatively, be a cement-based layer which is preferably keyed to the thermally-insulating material by a scrim which is adhered to the thermally-insulating material.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawing which shows a partly broken-away section through a window frame, two areas of which are covered by panels in accordance with the invention.

Referring to the drawing, an existing window area 1 comprises three glazed sections, namely a central section 2 comprising opening casements (not shown in detail), an upper section 3 comprising a pane of glass 4 sealed into a timber frame 5, and a lower section 6 comprising a pane of glass 7 sealed into a timber frame 8. The lower pane is obscured by an opaque sheet 9 mounted in the frame, there being an air gap (of, say, 25mm) between the pane 7 and the sheet 9. In each case, the pane of glass is mounted near that side of the frame which is at the exterior of the building.

The construction of a thermal insulation panel will [illegible] in exactly the same way.

Any existing glazing beads or external putty (not shown) may first be removed from around the outside of the pane 7, if necessary. The outer surface of the glass is cleaned and a layer of waterproof adhesive is applied to that surface. A frame-like trim, made of aluminium extrusions, is fitted against the glass and is fixed by screws to the frame 8. A polysulphide mastic is inserted between the outer edges of the trim and the frame, thereby sealing the trim to the frame. An upper trim member 11 is formed as an angle section with its outer edge turned down to provide a drip, whilst a lower trim member 10 and side members (not shown) are formed as channel sections. The trim members are mitred and sealed together at the corners.

A sheet 12 of expanded polystyrene of, say, 50mm thickness is coated with waterproof adhesive on its back surface and is inserted into the upper and lower trim members so that it fills the frame between those trim members. The outer edge 13 of the horizontal limb of the trim member 11 extends beyond the front surface of the sheet 12. The foam sheet is pressed against the pane of glass and against the trim members and adheres thereto. The side trim members are then fixed against the sheet.

A sheet 14 of plastics-coated steel completely covers the sheet 12 and is bonded thereto to prevent adverse weather conditions and ultraviolet light from affecting the stability of the polystyrene foam sheet 12, and also to act as a hard protective covering.

The trim and the sheet 14 may be coloured to suit the environment.

In place of the aluminium trim, a trim of uPVC or other suitable material could be used.

Instead of using the above-mentioned plastics-coated steel sheet, the insulation sheet 12 might alternatively be covered by a cement-based protective layer (not shown), formed by the following method. A sheet of cement-impregnated glass fibre scrim is affixed over the sheet 12 and its edges are tucked behind the trim. This operation may be performed more easily if the scrim is applied to the sheet 12 before the sheet 12 is inserted into the trim.

A layer of, say, 3mm thickness of a waterproof cement-based material is then sprayed over the scrim, the scrim serving to key the layer to the insulation sheet 12. The cement-based layer and the scrim together serve to protect the insulation sheet.

The insulating panel is equally applicable to both timber and metal frames. Although covering a pane of glass in the above-described embodiment, the panel can alternatively be used to cover other water-impervious sheets, such as sheets of metal or wood.

The invention could also be used to insulate and protect a pane of glass in a door.

Besides providing thermal insulation, the panel has certain anti-vandal properties. It has been found that it can withstand quite severe kicking. Bricks thrown at a test panel have merely dented the outer steel sheet 14.